

AD-A090 423

CONSTRUCTION ENGINEERING RESEARCH LAB (ARMY) CHAMPAIGN IL F/G 13/2
CASE STUDY USE OF EDITSPEC, THE CORPS OF ENGINEERS COMPUTER AID--ETC(U)
JUN 80 E S NEELY, E J CLARK

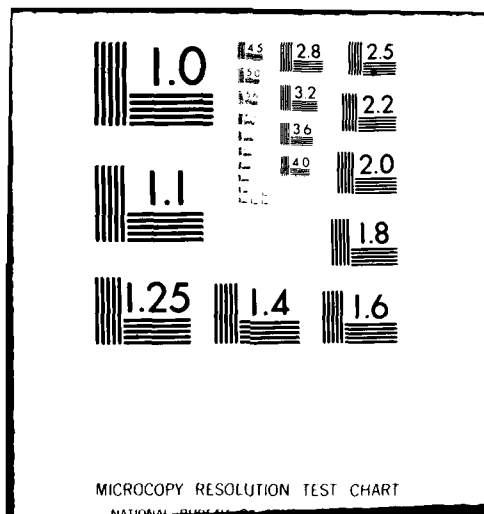
UNCLASSIFIED

NL

[or]
AD
A090 423



END
DATE
FILMED
11-80
DTIC



#NEELY, CLARK

AD A090423

CASE STUDY USE OF EDITSPEC,
THE CORPS OF ENGINEERS
COMPUTER AIDED SPECIFICATION PREPARATION SYSTEM (U)

EDGAR SAMUEL NEELY, JR., DR.
CONSTRUCTION ENGINEERING RESEARCH LABORATORY
CHAMPAIGN, IL 61820

EDSOL JEROME CLARK, MR.
U.S. ARMY ENGINEERING DIVISION
HUNTSVILLE, AL 35807

JUN 1980

INTRODUCTION. The Corps of Engineers has developed a computer-aided specification preparation system known as EDITSPEC. This system is being field tested at the Huntsville Division. Corps-wide implementation is scheduled in December 1980. EDITSPEC resides on one national computer system. Users access the system through typewriter terminals. Output is received at the typewriter terminals, local medium-speed printers, or central site high-speed printers. This paper describes the benefits expected from application of the EDITSPEC system, the guide specification process, and finally the method used to prepare project specifications. A prototype test description concludes the presentation.

BENEFITS. Several major benefits are anticipated when EDITSPEC becomes fully operational. The estimated magnitude of these benefits are listed below and will be verified during the prototype test.

1. Project specifications will be more complete, accurate, and consistent when the contract is advertised.
2. The cost of construction change orders due to specification deficiencies will be reduced 40 percent.

DDC FILE COPY

This document is the property of the U.S. Army Corps of Engineers and is loaned to you for your use only. It is not to be distributed outside your organization.

1

DTIC
SELECTED
S OCT 20 1980

405217
80 10 17 001

*NEELY, CLARK

3. Specification writers' production will increase 30 percent.
4. Typing production will increase 35 percent.
5. Total costs to produce project specifications will be reduced 25 percent.

A more detailed description of the areas in which EDITSPEC is expected to provide benefits is presented below.

CORPS OF ENGINEERS GUIDE SPECIFICATIONS (CEGS). Guide specifications are used as drafts when preparing project specifications. Changes to the CEGS are issued as notices.

1. Maintained in EDITSPEC by the Huntsville Division. Individual offices will no longer have to maintain the CEGS.
2. Reported errors will be corrected immediately.
3. Revisions to the guides will be available to field offices immediately. There will be no printing and mailing delays between the approval of a revision and its implementation by field offices.

PROJECT SPECIFICATIONS.

1. The writer will be provided with a posted guide specification. No resources will be required to post notices prior to application on a project.
2. Technical notes, providing instructions regarding specification preparation, will be printed directly after the text to which the note applies.
3. Writers using a guide in project specification preparation will be immediately notified of changes to the guide.
4. The writer will be provided with a project section containing all relevant guide text. No resources will be required to manually review and mark up the guide. The system will automatically pull all relevant text from the guide and place it into the project section.

*NEELY, CLARK

5. All referenced publications will be kept current and updated automatically. No resources will be required to check the reference publications for current listings.

6. The sources of all text will be identified. Minimum management resources will be required to review and approve the project-unique text in the specification.

7. A complete, consistent, and accurate project specification is produced at bid printing. Inconsistencies are reported to the project engineer and must be corrected before the system produces the bid printing copy.

CORPS OF ENGINEERS GUIDE SPECIFICATION (CEGS) PREPARATION FOR AUTOMATION. This section describes how a guide specification is prepared for automation. Portions of the Corps of Engineers guide specification (CEGS) entitled "CEGS-07510 BUILT-UP ROOFING" have been used to illustrate the process. Guide specifications are written to cover the most frequently encountered design conditions. An actual project design would not contain all design conditions covered by a guide. The first task is to decide what design conditions the guide will cover. The writer forms the design condition list before any text is written. The list for the example guide is shown in Figure 1.

FIGURE 1. CHECKLIST--CEGS-07510--BUILT-UP ROOFING

<u>C = Concept Design</u>		<u>F = Final Design</u>
<u>Condition</u>		
<u>Number</u>	<u>Design Conditions</u>	
<u>1</u>	<u>C</u>	<u>F</u>
	Control Condition (Required)	
	Built-up roofing substrate:	
<u>2</u>	<u>X</u>	<u>✓</u>
	Mineral-fiber, expanded perlite or fiberboard insulation	
<u>3</u>	<u>X</u>	<u>X</u>
	Composite board, cellular glass, isocyanurate or urethane insulation	
<u>4</u>	<u>X</u>	<u>X</u>
	Cast-in-place concrete	
<u>5</u>	<u>X</u>	<u>✓</u>
	Precast concrete	
<u>6</u>		
	Precast gypsum	
<u>7</u>	<u>X</u>	<u>X</u>
	Cast-in-place gypsum	
<u>8</u>	<u>X</u>	<u>X</u>
	Lightweight insulating concrete	
	Roof slopes:	
<u>9</u>	<u>✓</u>	<u>X</u>
	All slopes 1/2" per foot or less	
<u>10</u>	<u>X</u>	<u>X</u>
	All slopes greater than 1/2" to 1" per foot	
<u>11</u>	<u>X</u>	<u>X</u>
	All slopes greater than 1" to 3" per foot	

*NEELY, CLARK

<u>12</u>	<u>X</u>	<u>✓</u>	Combination of slopes including slopes 1/2" per foot or less
<u>13</u>	<u>X</u>	<u>X</u>	Combination of slopes, all greater than 1/2" per foot
			Average January temperature:
<u>14</u>	<u>✓</u>	<u>✓</u>	40° F and above
<u>15</u>	<u>X</u>	<u>X</u>	Below 40° F
<u>16</u>	<u>X</u>	<u>✓</u>	Gravel stops required
<u>17</u>	<u>X</u>	<u>✓</u>	Valleys required
<u>18</u>	<u>✓</u>	<u>✓</u>	Cants required
<u>19</u>	<u>✓</u>	<u>✓</u>	Wood walkways required
<u>20</u>	<u>X</u>	<u>✓</u>	Composition traffic surfaces required
<u>21</u>			Vertical surfaces abut sloped roof surfaces
<u>22</u>	<u>X</u>	<u>✓</u>	Bitumen samples required
<u>23</u>	<u>X</u>	<u>X</u>	Light-colored aggregate is available and work is in Air Force weather condition zones A or B
<u>24</u>	<u>✓</u>	<u>✓</u>	Army or Air Force construction is not in the vicinity of warmup/operating aprons. For work that is not in the vicinity of warmup/operating aprons, the roof substrates and slopes are as follows:
<u>25</u>	<u>X</u>	<u>X</u>	Concrete or insulation - all slopes 1/2" per foot or less
<u>26</u>	<u>X</u>	<u>X</u>	Cast-in-place concrete - slopes greater than 1/2" per ft
<u>27</u>	<u>X</u>	<u>✓</u>	Precast concrete - slopes greater than 1/2" per ft
<u>28</u>	<u>X</u>	<u>✓</u>	Expanded perlite, fiberboard or mineral fiber insulation - slopes greater than 1/2" per ft
<u>29</u>	<u>X</u>	<u>X</u>	Composite board, cellular glass, isocyanurate, or urethane - slopes greater than 1/2" per ft
<u>30</u>	<u>✓</u>	<u>✓</u>	Gypsum or insulating concrete - all slopes 1/2" per ft or less
<u>31</u>	<u>X</u>	<u>X</u>	Gypsum or insulating concrete - slopes greater than 1/2" per ft
<u>32</u>	<u>X</u>	<u>X</u>	Air Force construction is in the vicinity of AF warmup/operating aprons
			For work in the vicinity of AF warmup/operating aprons, roof substrates and slopes will be as follows:
<u>33</u>	<u>X</u>	<u>X</u>	Concrete or insulation - all slopes 1/2" or less
<u>34</u>	<u>X</u>	<u>X</u>	Cast-in-place concrete - slopes greater than 1/2" per ft
<u>35</u>	<u>X</u>	<u>X</u>	Precast concrete - slopes greater than 1/2" per ft
<u>36</u>	<u>X</u>	<u>X</u>	Expanded perlite, fiberboard or mineral fiber insulation - slopes greater than 1/2" per ft

*NEELY, CLARK

37	X	X	Composite board, cellular glass, isocyanurate or urethane insulation - slopes greater than 1/2" per ft
38	X	X	Gypsum or insulating concrete - all slopes 1/2" per ft or less
39	X	X	Gypsum or insulating concrete - slopes greater than 1/2" per ft

The second task is to form an outline. Once the outline has been established, the writer can begin to prepare the text, the third task. The fourth and one of the most important tasks is to convey the writer's ideas as to when each portion of text should be pulled from the guide and placed into a project specification. While this task may be trivial if each paragraph addresses only one design condition, it may be very complicated if each phrase in a sentence is written to address a different condition.

The writer must convey this information as quickly and efficiently as possible. For automation, this information is conveyed by marking the handwritten text. The contents of a guide can be divided into three classifications: (1) tables, (2) variable phrases, and (3) normal text. The method for marking text for each classification is presented below.

Tables - The writer must indicate under which design conditions each column and each row should be pulled from the guide and placed into the project specification. This information is indicated by writing the numbers of each design condition that would require use of the row to the left of the row. For columns, the writer indicates the design conditions by placing them above the columns. An example table is shown in Figure 2. The writer has indicated that portions of row four would be required only if the project contained one or more of design conditions 25, 26, 27, 28, or 29 and that portions of column three would be required only if the project contained design condition 1.

TABLE 1. LAPS FOR ROOFING FELTS AND ROLL ROOFING

^① LAYERS OR PLIES	^① LAPS IN INCHES FOR 36-INCH WIDTH	^① STARTING WIDTHS IN INCHES FOR 36-INCH WIDTH
38 39	1 2	4 19 36 18 and 36

*NEELY, CLARK

1	3	24-2/3	12, 24, and 36
(25) (26) (27)	4	27-1/2	9, 18, 27 and 36
(28) (29)			

FIGURE 2. MARKING TABLES

Variable Phrases - Guides contain phrases that vary depending on the design conditions. Phrases are normally, but not necessarily, marked in the guide by the use of open and close brackets ([]). There is usually a fixed set of replacement phrases for each variable phrase. For automation, each variable phrase in the text is marked with a flag and each unique flag is given an identifier number. All possible choices for a flag (phrase) are defined in the order of the simplest to the most complicated. The writer marks the design conditions for each phrase to the left of the phrase definition. In the example shown in Figure 3, the unbracketed phrase "Concrete or Insulation" is marked as a variable phrase and identified as flag 7. The three choices for flag 7 are shown below the text. The writer has indicated that choice two, "Insulation," should be applied if design condition 2 or 3 is present in the project. Choice three, "Concrete or Insulation," should be applied if any of the design condition pairs 2 and 4, 2 and 5, 3 and 4, or 3 and 5 are in the project.

(25) 4.1.2 On *FL7; § Concrete or Insulation*-Surfaces:
 (26) Four plies of 15-pound asphalt-saturated felt
 (27) shall be mopped in solid with hot asphalt.
 (28) Felts shall be laid shingle-fashion at right
 (29) angles to the direction of the roof slope and
 lapped in accordance with Table I/*FL8; § and
 fastened in accordance with Table II, III/*-.
 The flashings shall be installed and the flood
 coat and surfacing applied.

FLAG 7

(4) (5)	Choice 1 - Concrete
(2) (3)	2 - Insulation
(2) (4)	3 - Concrete or Insulation
(2) (5)	
(3) (4)	
(3) (5)	

FIGURE 3. MARKING FLAGS

*NEELY, CLARK

Normal Text - When the text to be marked is several lines long, a bracket at the left margin can be used to indicate the text. The example in Figure 4 shows that the text should be pulled if design condition 1 is present in the project. When the text to be marked is only a few words long, the design condition numbers are written above the text. A slash and a dash are used to indicate the start of the phrase and a dash and a slash are used to indicate the end of the phrase. The first line of the example in Figure 4 indicates that the phrase "or coal-tar bitumen" should be pulled if the project contains either design condition 25 or 30.

① 2. GENERAL: Asphalt /or coal-tar bitumen^{②⑤ ③⑦} built-up roofing shall be applied to the roof surfaces indicated.
2.1 Storage of Materials: Felts and roll roofing shall not be exposed to any moisture before, during, or after delivery to the site. Felts and roll roofing shall be stored in an enclosed building or in a trailer, stacked on end, and maintained above 60°F for 24 hours immediately before laying. /Aggregate shall be maintained surface dry as defined by ASTM D 1863^{②④}

FIGURE 4. MARKING TEXT LINES

The marked-up text and the design condition list are given to an EDITSPEC operator, who enters the text and translates the markings to computer commands. The operator removes the actual text of each referenced publication and replaces it with a computer command requesting that this information be copied from the master reference publication list only when a print request is issued. This permits the master reference publication list to be maintained at one location and ensures the inclusion of the latest publication within the guide.

Since changes are made directly within the guide, eliminating the need for pages which must be posted by field personnel, changes are immediately available to all field personnel in posted form. When changes are made to a guide, the operator issues an "update message" command. The EDITSPEC system sends one update message for each project currently applying the guide. The project specification writer will receive the message as soon as he enters EDITSPEC.

*NEELY, CLARK

Errors within a guide found by field personnel are reported by telephone to the EDITSPEC "HOT LINE." Immediate action will be taken by the HOT LINE personnel to correct the reported errors.

The commands to create the first page of guide CEGS-07510.00 are shown in Figure 5. The "NEW" command creates a document named "CEGS07510.00" on a dataset (or file) named "data." The "EDIT" command allows the document to be edited. Text is entered into the document through the "INPUT" command. Internal format commands have been embedded into the text for center (*cj---*), left (*lj---*), and right (*rj---*) justification of text during printing. Commands to skip lines (*sl*) and to perform automatic paragraph numbering and indentation (*pl*) have also been added. Reference publications are added by the "COPY TABLE NO MOVE" command. The first copy table (ct) command requests that the publication located on row 54 of the table 100 in the reference publication list named "referencepub" be copied into the guide only when a print request is given. The "ct" commands generate the "*ct*" commands shown on lines 1600 through 3100 of the listing of the text. Note that the actual text for the publication is not copied, but a request for a future copy is stored in the correct location in the guide.

FIGURE 5. GUIDE GENERATION COMMANDS

```
.new (cegs07510.00); data.
.edit (cegs07510.00).
.input.
*lj DEPARTMENT OF THE ARMY*   *lg(-11) CEGS-07510* *sl*
*lj OFFICE OF THE CHIEF OF ENGINEERS* *u* *lj(-11) July 1977*
*lj(-11) Superseding* *sl*
*lj(-11) CE-220.12* *sl*
*cj Notice 3* *sl*
*cj May 1979* *sl1*
*cj CORPS OF ENGINEERS GUIDE SPECIFICATION* *sl*
*cj MILITARY CONSTRUCTION* *sl4*
*cj SECTION *f11* * *sl1*
*cj BUILT-UP ROOFING* *sl*
*tc 1; *pl* APPLICABLE PUBLICATIONS* : The publications listed
below form a part of this specification to the extent referenced.
The publications are referred to in the text by the basic designa-
tion only.
*p2* Federal Specifications (Fed. Spec.): *sl1*
*tb 250*
.ct (referencepub); 100;;;54;1,2;nm.
```

*NEELY, CLARK

.ct (referencepub); 100;;;78;1,2;nm.

.input.

te

p2 American Society for Testing and Materials (ASTM) Publications:

tb 250

.ct (referencepub); 200;;;21;1,2;nm.

.ct (referencepub); 200;;;25;1,2;nm.

.ct (referencepub); 200;;;26;1,2;nm.

.ct (referencepub); 200;;;38;1,2;nm.

.ct (referencepub); 200;;;42;1,2;nm.

.ct (referencepub); 200;;;10;1,2;nm.

.ct (referencepub); 200;;;11;1,2;nm.

.ct (referencepub); 200;;;15;1,2;nm.

.ct (referencepub); 200;;;15;1,2;nm.

.ct (referencepub); 200;;;28;1,2;nm.

.ct (referencepub); 200;;;29;1,2;nm.

.input.

te

*tc 1; *pl* GENERAL* : Asphalt

or coal-tar bitumen

built-up roofing shall be applied to the roof surfaces indicated.

.lt text.

100 *lj DEPARTMENT OF THE ARMY* *lj(-11) CEGS-07510* *sl*

200 *lj OFFICE OF THE CHIEF OF ENGINEERS* *u* *lj(-11) July 1977*

300 *lj(-11) Superseding* *sl*

400 *lj(-11) CE-220.12* *sl*

500 *cj Notice 3* *sl*

600 *cj May 1979* *sl1*

700 *cj CORPS OF ENGINEERS GUIDE SPECIFICATION* *sl*

800 *cj MILITARY CONSTRUCTION* *sl4*

900 *cj SECTION *f11* *sl1*

1000 *cj BUILT-UP ROOFING* *sl*

1100 *tc 1; *pl* APPLICABLE PUBLICATIONS* : The publications listed

1200 below form a part of this specification to the extent referenced.

1300 The publications are referred to in the text by the basic
designation only.

1400 *p2* Federal Specifications (Fed. Spec.): *sl1*

1500 *tb 250*

1600 *ct (referencepub); 1;54;1,2;100*

1700 *ct (referencepub); 2; 78;1,2;100*

1800 *toe*

1900 *p2* American Society for Testing and Materials (ASTM)
Publications:

2000 *tb 250*

2100 *ct (referencepub); 3;21;1,2;200*

2200 *ct (referencepub); 4;25;1,2;200*

2300 *ct (referencepub); 5;26;1,2;200*

*NEELY, CLARK

2400 *ct (referencepub); 6;38;1,2;200*
2500 *ct (referencepub); 7;42;1,2;200*
2600 *ct (referencepub); 8;10;1,2;200*
2700 *ct (referencepub); 9;11;1,2;200*
2800 *ct (referencepub); 10;15;1,2;200*
2900 *ct (referencepub); 11;19;1,2;200*
3000 *ct (referencepub); 12;28;1,2;200*
3100 *ct (referencepub); 13;29;1,2;200*
3200 *te*
3300 *tc 1; *pl* GENERAL* : Asphalt
3400 or coal-tar bitumen
3500 built-up roofing shall be applied to the roof surfaces
indicated.
.upda (cegsmastersp); (a new guide 07510.00 has been issued.)

OFFICE-TAILORED GUIDE SPECIFICATION PREPARATION. It is often advantageous for a Corps office to tailor an CEGS guide or a portion of the guide for local geographic and/or climate conditions. The tailored text is applied to produce project specifications in lieu of the original guide. When a complete guide is tailored, it is stored in its entirety under an office guide name. For example, if Huntsville Division (Corps office 87) tailored guide cegs 07510.00, the name of the tailored guide would be 87GS07510.00. When only a few lines of text requires tailoring, the tailored text is the only text stored in the document. For example, the Huntsville Division could tailor only the paragraph "APPLICABLE PUBLICATIONS" to read:

APPLICABLE PUBLICATIONS: The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

PROJECT SPECIFICATION PREPARATION

GENERATION. Preparation of a specification begins by obtaining the master guide specification index and marking the index to indicate those guides that will be used for the project. The marked index is given to an EDITSPEC operator, who enters the selections and obtains a design condition list for each guide specification that has been selected. This design condition list contains all design conditions covered by the guide. The specification writer is provided with the design condition checklist and a fully posted copy of each guide, if requested. The writer reviews the design and marks the checklist as follows:

*NEELY, CLARK

1. Checks () the design conditions that are in the project.
2. Marks (X) the design conditions that are not in the project.
3. Leaves design conditions that are currently undecided unmarked.

A concept design example is shown in Figure 6. The marked checklist is given in the concept column of Figure 1.

CONCEPT DESIGN EXAMPLE

Design Criteria:

Location: Lone Star AAP, Texarkana, Texas
Building No. 1: 40' x 60' roof area
Average roof slope of 1/4 inch per foot
Precast gypsum roof deck
Cants and wood walkways required
Parapet walls and gravel stops not required

FINAL DESIGN EXAMPLE

Design Criteria: The following buildings have been added to the project:

Building No. 2: 60' x 90' roof area
Average roof slope of 1 inch per foot
Steel deck with fiberboard insulation
Parapet walls, valleys and gravel stops required
Building No. 3: 60' x 90' roof area
Average roof slope of 2 inches per foot
Precast concrete roof deck
Parapet walls, valleys and gravel stops required
Composition traffic surface

FIGURE 6. CONCEPT AND FINAL DESIGN EXAMPLE

The writer decides which office-tailored guide specification sections are to be applied in lieu of and in addition to the CEGS guides and which office-tailored text is to be used instead of portions of the CEGS guide text. Handwritten notes to the EDITSPEC operator are prepared defining the required replacements. In the example, the paragraph titled "APPLICABLE

*NEELY, CLARK

PUBLICATIONS" is to be replaced by the text of document 87GS07510.00.

Project-unique text is written to cover design conditions not covered by the CEGS or office guides. Each segment of project-unique text is marked as to its final location in the project specification. The writer actually marks the location in the guide that the project-unique text would logically appear if it were incorporated into the guide. In the example, the paragraph titled "GENERAL" is to be modified to read

"GENERAL: Asphalt built-up roofing shall be applied to the roof surfaces indicated. Materials and their application to the built-up roofing system shall conform to requirements of Factory Mutual and the requirements specified herein to provide an approved Class I-90 roof."

The EDITSPEC operator is given the completed design condition checklist, the tailored office guide replacement instructions, and the project-unique text. The operator enters the completed checklist and issues the "GENERATE" command, which causes the system to generate a new project section and add commands to copy the required guide text to the project. These commands are performed only when a print request is given. The operator edits the project section and inserts the replacement request and the project-unique text. Following a logic check command, the system checks the text to insure that it is logically correct, complete, and does not include extraneous material. An example generation is shown in Figure 7.

```
.spec (87p207510.00); a; 1, -2, -3, -4, -5,  
. 6, -7, -8, 9, -10, -11, -12, -13, 14,  
. -15, -16, -17, 18, 19, -20, -22,  
. -23, 24, -25, -26, -27, -28, -29,  
. 30, -31, -32, -33, -34, -35, -36, -37, -38, -39.  
  
.generate (87p207510.00); (cegs 07510.00); dsquo2; 1; 0.  
.edit (87p207510.00).  
.lt text.  
100 *co (cegs07510.00); -100; 900-1000*  
200 *co (cegs07510.00); -200; 1100-1300*  
300 *co (cegs07510.00); -300; 1400-1500*  
400 *ct (cegs07510.00); -400; 1,2;1,2*  
500 *co (cegs07510.00); -900; 1800-2000*  
600 *ct (cegs07510.00); -1000; 1,2,6,8,10;1,2*  
700 *co (cegs07510.00); -2100; 3200-3200*
```

*NEELY, CLARK

```
800 *co (cegs07510.00); -2200; 3300-3500*  
.change 200; /co/; /cu/.  
.copy (87gs07510.00);;200;10;nm.  
.change 800; /co/; /cu/.  
.input 800; 10.
```

*tc 1; *pl*

GENERAL*: Asphalt built-up roofing shall be applied to the roof surfaces indicated. Materails and their application to the built-up roofing system shall conform to requirements of Factory Mutual and the requirements specified herein to provide an approved Class I-90 roof.

.lc.

.lt text.

```
100 *co (cegs07510.00); -100; 900-1000*  
200 *cu (cegs07510.00); -200; 1100-1300*  
210 *co (87gs 07510.00); 1*  
300 *co (cegs07510.00); -300; 1400-1500*  
400 *ct (cegs07510.00); -400; 1,2; 1,2*  
500 *co (cegs07510.00); -900; 1800-2000*  
600 *ct (cegs07510.00); -1000; 1,2,6,8,10; 1,2*  
700 *co (cegs07510.00); -2100; 3200-3200*  
800 *cu (cegs07510.00); -2200; 3300-3500*
```

810 *tc; *pl* GENERAL*: Asphalt built-up roofing shall be applied to the roof surfaces indicated. Materials and their application to the built-up roofing system shall conform to requirements of Factory Mutual and the requirements specified herein to provide an approved Class I-90 roof.

FIGURE 7. PROJECT GENERATION COMMANDS

UPDATING. Updating may be caused by a project redesign, a more detailed design, and/or guide specification changes. The process begins by reviewing the previous design condition checklist and preparing an updated checklist. The project-unique text and office guide references are reviewed and corrected if necessary. All materials are given to the operator, who enters the changes to the design condition checklist and issues the "UPDATE" command. The system then obtains the latest copy of the guide, the current updated project checklist, and the outdated project specification section. The section is rewritten to comply with the updated items automatically. The operator edits the section changing the replacement requests and project-unique text as

*NEELY, CLARK

required. A logic check command is issued to insure the project specification completeness. An example of an updated design is shown in Figure 6. The updated checklist is shown in the "final" column of Figure 1. The commands issued are shown in Figure 8. No changes to the guide references nor project-unique text is required.

A comparison of the *ct* command on line 600 of the concept and the final design project specifications shows that the publications to be copied from the reference publication document for the concept design (i.e., rows 1, 2, 6, 8, and 10) have been automatically changed to reflect the change in the final design (i.e., rows 1 through 11).

When all project sections are complete and the project is ready for printing, the operator issues the print project command (PPRO). The system will automatically obtain the latest references and latest guide text, automatically paragraph and paginate correctly, and print complete project.

```
.spec (87p207510.00); c; 2, 5, 6, -9, 12, 14, 16, 17, 20, 21, 22,
  27, 28.
.update (87p207510.00); (cegs07510.00); dsguo2; 1; 0.
.edit (87p207510.00).
.lc.
.lt text.
100 *co (cegs07510.00); -100; 900-1000*
200 *cu (cegs07510.00); -200; 1100-1300*
210 *co (87gs 07510.00); 1*
300 *co (cegs07510.00); -300; 1400-1500*
400 *ct (cegs07510.00); -400; 1, 2; 1, 2*
500 *co (cegs07510.00); -900; 1800-2000*
600 *ct (cegs07510.00); -1000; 1,2,3,4,5,6,7,8,9,10,11; 1,2*
700 *co (cegs07510.00); -2100; 3200-3200*
800 *cu (cegs07510.00); -2200; 3300-3500*
```

```
810 *tc; *pl* GENERAL*: Asphalt built-up roofing shall be
applied to the roof surfaces 820 indicated. Materials and their
application to the built-up roofing system 830 shall conform to
requirements of Factory Mutual and the requirements 840 specified
herein to provide an approved Class I-90 roof.
```

FIGURE 8. PROJECT UPDATE COMMAND

*NEELY, CLARK

PROTOTYPE TEST PROCEDURE. All Corps Military Construction guide specifications and the master reference publications list are loaded in the data base and EDITSPEC is being tested at Huntsville Division. The purpose is to verify the expected benefits. Detailed time and motion records will be kept on four basic functions:

1. Updating Guide Specifications -- Huntsville maintains the Corps guide specifications on EDITSPEC.

2. Project Specification Preparation Via MTST Machines -- Huntsville will produce the complete project specification for one project using their current method of specification preparation, IBM magnetic tape/selectric typewriter machines.

3. Project Specification Preparation Via EDITSPEC - Manual System. The same project specification will be produced using EDITSPEC as a normal text editor.

4. Project Specification Preparation Via EDITSPEC - Automatic System -- Several sections from the same project will be produced using the automatic generation capabilities. The complete project specification cannot be automatically produced since all required CEGS guides have not been coded for automation.

PROTOTYPE TEST RESULTS AND EVALUATION. Preliminary evaluation will be conducted in June 1980. Final evaluation will be conducted in August 1980. The Assistant Secretary of the Army will review the prototype test results. If the test is successful, field implementation will begin in December 1980.